DETAILED ACTION

This Office Action is responsive to the Applicant's communication filed January 28, 2010. In virtue of this communication, claims 1-9 are pending in the instant application.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 2, 2010 has been entered.

Response to Arguments

1. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

Disclosure

2. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korenaga (JP10-012539).

With regard to claim 1, Korenaga discloses a moving magnet type linear actuator (see [0002] and figure 3 for all numerical references) comprising:

a stator unit including a stator base [29f] and an armature unit [24] having a magnetic core [24a] secured to the stator base [29f] and an armature winding [24b] wound around the magnetic core [24a] (see [0032] and [0037]); and

a moving unit [3] including a field permanent magnet [26b] arranged so as to face the magnetic core [24a] via a magnetic first gap, and a magnet holder [26a] movably disposed on the stator base [29f] while holding the field permanent magnet [26b] (see [0033]),

wherein the magnet holder [26a] is made of nonmagnetic material (see [0037]; the statement that the attraction magnets [29a-d] are used in conjunction with the yokes [24a and 24c] implies that the magnet holder is non-magnetic, otherwise it would produce its own magnetic force to offset its weight),

wherein a magnetic back yoke [24c] is arranged at an anti-armature side of the field permanent magnet [26b] (see figure 3), and has a width approximately the same as a width of the field permanent magnet [26b] and a length exceeding approximately a stroke of the moving unit [3] (As can be seen in figure 3, the moving unit's movement is limited by the ends of the back yoke.), longitudinal ends of the magnetic back yoke [24c] being secured to the stator unit and the armature unit [24] (see figure 3),

wherein a magnetic second gap is formed between the magnetic back yoke [24c] and the field permanent magnet [26b] (see [0033]);

except that Korenaga does not expressly disclose that the magnetic second gap is set to be larger than the magnetic first gap to offset magnetic attraction forces applied to the movable unit.

Korenaga does, however, disclose that the magnetic first and second gaps can be varied to compensate for the weight of the moving unit and used to stabilize the unit (see [0030] and [0031]). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to disclose similar values for the gaps, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

With regard to claim 2, Korenaga discloses the moving magnet type linear actuator as recited in claim 1, as stated above, wherein, when the armature unit [24] has an open slot (see figure 3; the space between the cores/yokes [24a/24c] is open at both the front and rear), except that Korenaga does not expressly disclose that the magnetic first gap / the magnetic second gap is set to 0.45/0.55 to 0.35/0.65.

However, Korenaga does disclose that the magnetic first and second gaps can be varied to compensate for the weight of the moving unit and used to stabilize the unit (see [0030] and [0031]). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to disclose similar values for the gaps, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

With regard to claim 3, Korenaga discloses the moving magnet type linear actuator as recited in claim 1, as stated above, wherein, when the armature unit has a semi-open slot (see figure 3; the space between the cores/yokes [24a/24c] is open at both the front and rear), except that Korenaga does not expressly disclose that the magnetic first gap / the magnetic second gap is set to 0.49/0.51 to 0.48/0.52.

However, Korenaga does disclose that the magnetic first and second gaps can be varied to compensate for the weight of the moving unit and used to stabilize the unit (see [0030] and [0031]). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to disclose similar values for the gaps, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

6. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korenaga in view of Tsuboi et al (US 2001/0048249 A1), hereinafter referred to as "Tsuboi".

With regard to claim 4, Korenaga discloses the moving magnet type linear actuator as recited in claim 1, as stated above, except that Korenaga does not expressly disclose that a scale portion of a linear scale is secured to the magnet holder, and wherein a detecting portion of the linear scale is secured to the stator base so as to face the scale portion via a third gap.

Tsuboi discloses a moving magnet type linear actuator (see figures 1-3) wherein a scale portion [15] of a linear scale [14] is secured to the magnet holder [3], and wherein a detecting portion [16] of the linear scale [14] is secured to the stator base [2] so as to face the scale portion via a third gap (see figure 3 and [0050], lines 15-22).

It would have been obvious to one of ordinary skill in the art when the invention was made to implement the magnet holder of Korenaga by adding a linear scale as taught by Tsuboi, for detecting the position thereof, since Tsuboi teaches that such a scale and detecting portion has high resolution and is less vulnerable to changes in distance between the scale and the detecting portion, providing highly accurate position control (see [0022], lines 1-10).

With regard to claim 5, Korenaga discloses the moving magnet type linear actuator as recited in claim 2 or 3, as stated above, except that Korenaga does not expressly disclose that two linear guide rails are extended in a longitudinal direction of

the armature unit and arranged in parallel at both sides of the armature unit, wherein guide blocks are arranged on corresponding linear guide rails, and wherein the magnet holder is secured to the guide blocks.

Tsuboi discloses a moving magnet type linear actuator (see figures 1-3) wherein two linear guide rails [5] are extended in a longitudinal direction of the armature unit [10] and arranged in parallel at both sides of the armature unit [10], wherein guide blocks [6] are arranged on corresponding linear guide rails [5], and wherein the magnet holder [3] is secured to the guide blocks [6] (see figure 3 and [0048], lines 6-14).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the magnet holder of Korenaga by securing it onto linear guide rails as taught by Tsuboi, for limiting the movement thereof, since Tsuboi teaches that parallel rails provide steady and secure movement of the magnet holder (see [0030], lines 7-14).

With regard to claim 6, the combination of Korenaga and Tsuboi discloses the moving magnet type linear actuator as recited in claim 5, as stated above, wherein a hole is formed in the magnet holder [26a] of non-magnetic material (see [0037] of Korenaga), and the field permanent magnet [26b] is secured in the hole (see figure 3 of Korenaga). Tsuboi discloses the field permanent magnet [13] is secured to the magnet holder [3] having a width corresponding to a width direction space between the guide blocks [6] (see figure 3 of Tsuboi). To employ forming a hole and inserting the magnet

to form the assembled mover of Tsuboi would have been obvious to one of ordinary skill in the art.

With regard to claim 7, the combination of Korenaga and Tsuboi discloses the moving magnet type linear actuator as recited in claim 5, as stated above, wherein a stopper mechanism [18, 20] (see figure 1 and [0051], lines 6-8 and 22-27 of Tsuboi) is provided at each of four ends of the two parallel linear guide rails [5] (The two stopper mechanisms shown extend across both guide rails at each end.).

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Korenaga in view of Chitayat (US 5,783,877).

With regard to claim 8, Korenaga discloses the moving magnet type linear actuator as recited in claim 1, as stated above, except that Korenaga does not expressly disclose that a conduit for a forced cooling liquid medium is embedded in the stator base.

Chitayat discloses a linear motor (see col. 1, lines 5-10) wherein a conduit [128, 130] (see figure 10) for a forced cooling liquid medium is embedded in the stator base [132] (see col. 9, lines 62-67 and col. 10, lines 3-9).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the moving magnet type linear actuator of Korenaga by adding a conduit in the stator base as taught by Chitayat, for improving the cooling thereof, since Chitayat teaches that better cooling of linear motors allows for faster acceleration and increases their utility (see col. 1, lines 40-50).

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Korenaga in view of Korenaga (US 6,107,703), hereinafter referred to as "Korenaga 703".

With regard to claim 9, Korenaga discloses the moving magnet type linear actuator as recited in claim 1, as stated above, except that Korenaga does not expressly disclose that the magnetic back yoke is constituted by a laminated member of thin board electromagnetic plates.

Korenaga 703 discloses a magnetic yoke [6] constituted by a laminated member of thin board electromagnetic plates (see col. 4, lines 50-55)

It would have been obvious to one of ordinary skill in the art when the invention was made to implement the magnetic back yoke of Korenaga by forming it from laminated plates as taught by Korenaga 703, for reducing the eddy currents thereof, since Korenaga 703 teaches that reducing said eddy currents ensures high speed and high precision positioning (see col. 4, lines 50-55).

Inquiry

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Andrews whose telephone number is (571)270-7554. The examiner can normally be reached on Monday through Thursday between the hours of 7:30 and 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Quyen Leung can be reached at (571)272-8188. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tran N. Nguyen/

Primary Examiner, Art Unit 2834

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